

Citation:

Mukuddem-Petersen J, Oosthuizen W, Jerling JC. A systematic review of the effects of nuts on blood lipid profiles in humans. *J. Nutr.* 2005 Sept; 135: 2,082-2,089. PMID: 16140880

PubMed ID: [16140880](#)

Study Design:

Narrative Review

Class:

R - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To conduct a systematic review to investigate the effects of nuts on the lipid profile.

Inclusion Criteria:

Studies were included if the objective was to investigate the independent effect of nuts on lipid concentrations in humans.

Exclusion Criteria:

Trials were excluded when the independent effects could not be assessed and studies had incomplete or missing data.

Description of Study Protocol:**Design**

- Two reviewers independently assessed studies to determine eligibility
- Data extracted by using a pre-piloted standardized form, and quality determined for all the identified intervention studies
- A third reviewer adjudicated differences in data extracted or quality score were by and then finalized in discussion among the three authors.

Dietary Intake/Dietary Assessment Methodology

Dietary intervention trials with the primary objective of determining the effects of nuts on lipid concentrations.

Statistical Analysis

- No formal statistical analysis was performed due to large differences in study designs of the dietary intervention trials
- Studies were identified through MEDLINE (8) (since inception to August 2004) and Web of Science (9) (from 1994 to August 2004) research databases, supplemented by contact with authors of papers and reference lists of relevant publications
- Search terms used included MeSH terms (MEDLINE): Nuts [MeSH] AND ("Lipoproteins"[MeSH] OR "Cholesterol"[MeSH]) OR "Triacylglycerol"[MeSH]) and key words (Web of Science): (nuts OR walnut* OR almond* OR pecan* OR macadamia* OR hazelnut* OR peanut* OR pistachio*) AND (cholesterol OR triacylglycerol OR lipoprotein).

Data Collection Summary:

Dependent Variables

- Blood TC
- LDL-cholesterol (LDL-C)
- HDL-cholesterol (HDL-C)
- Triacylglycerols (TG).

Control Variables

- Selected studies received a rating based upon the methodology as it appeared in the publication
- Criteria for quality assessment of the dietary intervention trials were used:
 - The study was controlled
 - Randomization was performed
 - Justified sample size (20 participants or about 20 with power calculation for TC or LDL-C)
 - Good compliance
 - Single-blind study
 - Groups were similar at baseline for the most important prognostic indicators or differences in baseline characteristics were controlled for statistically
 - No order of treatment effect (applicable to crossover trials)
- The following quality scores were assigned:
 - One: If all of the above criteria were present
 - Two: If controlled and two criteria were missing
 - Three: If not controlled or = three criteria were missing
- Furthermore, the letter "a" was assigned for controlled feeding trials and "b" for studies conducted under free-living conditions. Also, the nut studies that received a three rating were not considered when conclusions were drawn. No formal statistical analysis was performed due to large differences in study designs of the dietary intervention trials.

Description of Actual Data Sample:

- *Initial N*: 186 healthy or diseased (216 hypercholesterolemic, 66 hyperlipidemic, 30 type 2 diabetes); mixed (95); subjects (312 men and 281 women)
- *Age*: Adults, age not given
- *Ethnicity*: Not described, but international

- *Location:* International.

Summary of Results:

- 415 articles were screened (titles and abstracts, original research and review papers); 71 were considered in depth for inclusion
- 48 of these were excluded due to incomplete or missing data and because the independent effects of nuts could not be assessed
- From this comprehensive literature search, 23 original research papers were identified that were suitable for inclusion in this systematic review. Of the 23 studies, 16 received a one or two rating
- The experimental designs were variable; subject characteristics differed (normolipidemic), as did the degree of dietary control, the type and amount of fat (ranging from 20% to 45%), dose and mode of nuts consumed, duration of the studies, the control diets and sample sizes
- Most of the nut intervention diets were diets low in SFA, trans-fatty acids and dietary cholesterol and high in unsaturated fat and dietary fiber
- The majority of the studies were short (four to six weeks); only one study lasted six months. Most of the studies (12 of 16) included about 20 subjects per group, sufficient to detect clinically significant changes in TC and LDL-C
- However, according to power calculations (80% power at a level of 5% significance) based on data from several studies, it was clear that not all of the studies had adequate power to detect clinically significant changes in HDL-C and TG
- At least 109 participants per treatment group are required to detect an increase in HDL-C of 0.13mmol per L, which might reduce the risk of CVD by 10%. For TG, at least 67 participants per treatment group are required to detect a decrease in TG of 0.31mmol per L, which in turn may decrease the risk of CVD by 10%. For the latter effect, it is important to consider the large (12.9% to 40.8%) intra-individual variation in TG concentrations
- The results of three almond, two peanut, one pecan and four walnut studies showed there was a decrease in TC between 2% to 16% and LDL-C between 2% to 19%, compared with subjects consuming control diets
- Consumption of approximately 50 to 100g per day of nuts (approximately 1.5 to 3.5 servings) at equal to, or more than, five times per week, while maintaining fat intake at approximately 35% of energy, may significantly decrease total and LDL-C in normo- and hyperlipidemic people.

Author Conclusion:

- On the basis of the results of these nut intervention studies, it is appropriate to recommend that normo- and hyperlipidemic individuals consume a variety of nuts (about 50 to 100 g) at least five times per week
- The unique nutrient and non-nutrient composition of nuts requires further research to elucidate the possible mechanisms responsible for the LDL-C-lowering effect.

Reviewer Comments:

None.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	N/A

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	Yes
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	???
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes